Applied Magnetic Resonance 2015 vol.46 N5, pages 515-522

Structure and Metastability of MF2 (M = Ca, Sr, Ba) Fine Powders Mechanochemically Doped with Er^{3+} Ions

Irisova I., Kiiamov A., Korableva S., Rodionov A., Tayurskii D., Yusupov R.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015, Springer-Verlag Wien. In the paper thermal treatment investigations of the MF2 (M = Ca, Sr, Ba) fine powders mechanochemically doped with Er^{3+} ions using electron paramagnetic resonance and X-ray diffraction are presented. It is shown that the prepared samples are found in the nonequilibrium metastable state characterized by the high concentration of the cationic vacancies and prevalence of the cubic symmetry-doped Er^{3+} ion centers. Vacancies formed when the deformation exceeds the elastic limit serve both as the means for a nonlocal charge compensation and a route for mechanically activated diffusion. Annealing brings the powders to the ground state with the most of the vacancies healed and the trigonal symmetry of the impurity Er^{3+} centers in SrF2 and BaF2 due to the local compensation by the interstitial fluorine ion.

http://dx.doi.org/10.1007/s00723-015-0643-x